

KEEPING MILK GOATS IN INDIA



BY

J. L. GOHEEN, B. A.

Price 8 Annas

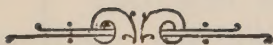


22500899301

KEEPING MILK GOATS IN INDIA

BY

J. L. GOHEEN, B. A.



Printed at the Aryabhushan Press, House No. 936/3, Bhamburda,
by Mr. Anant Vinayak Patwardhan, B.A., and published
by Mr. J. L. Goheen, B. A., at the American
Presbyterian Mission, Sangli.

1933

WELLCOME INSTITUTE LIBRARY	
Coll.	welMOmec
Coll.	pam
No.	V 200
	1933
	G 61 K

TO,
INDIA'S VILLAGE PEOPLE

WHO,
**in the midst of real want,
always show genuine hospitality.**

FOREWORD.

I was very pleased to have been given the opportunity to read through this little book when in manuscript. It meets a very long felt want. I, as Live Stock Expert to Government, have many enquiries regarding the breeding, feeding, and management of goats, and I now am glad to say that this little book in simple language answers all the questions ever put to me.

The author has had personal experience in this subject. His very practical advice in simple language should be a great help to goat keepers.

The goat is the poor man's cow and can be made a real asset if the advice offered in this book is followed.

EDWARD J. BRUEN,

Live Stock Expert to Government,
Bombay Presidency.

INTRODUCTION.

In his most useful little book entitled, "Food", Doctor Robert McCarrison, Director of Nutritional Research, Pasteur Institute, Coonoor, in Lesson No. 14, dealing with the subject of Milk, goes on to say (page 68), "Goats' milk and sheeps' milk contain more protein and fats and slightly more vitamins A and D than cows' milk; they are very excellent foods. If the breed of goats and their milk-yielding capacity were improved throughout India, as has been done in some places, it would be of very great benefit to the people".

Again, at the bottom of page 69, "If the food contains enough milk and milk-products, then it is not necessary to eat flesh meat at all. Enough milk is not less than one pint a day, and a quart if possible; but few children in India, consume anything like this amount."

As one who is a firm believer in goats' milk and a long-time admirer of the affectionate little animal that gives the milk, it has been the attempt of the writer to prepare this little book in such a manner as to help bring about that improvement in India which Dr. McCarrison urges. There is practically no literature in the vernaculars on this subject and very little in English that is available in India.

Now, the author does not pretend to be a student of Basic English, a fact which he regrets. However, he has tried faithfully to keep the language of the booklet as clear

and simple as possible. He has had in mind, for the English edition, those whose knowledge of the language may be very limited. In order to bring home certain ideas to the mind of such readers a certain amount of repetition has seemed necessary. However, the author would apologize for any tendency 'to stagnate' that may be found. That certainly has not been his desire.

Some nine years ago a sum of Rs. 500/- was presented to the Sangli Industrial and Agricultural School by the Trustees of the Sir Sassoon David Trust Fund for the publication of a small book in the Marathi language on the subject of 'Poultry Keeping'. That book is now in its second edition and there is enough money accumulated from its sales to finance this book. Hence, great credit is due to the Trustees of that Fund for making it possible to publish two books on somewhat related agricultural subjects. The author gladly acknowledges his indebtedness to them.

He also wishes to mention the genuine interest he has received from Mr. E. J. Bruen, Live Stock Expert to the Government of Bombay, whose encouragement has meant much in the preparation of the book; from Capt. C. M. Flanders, Superintendent of Municipal Markets, Bombay, who is a well-known authority on milk goats and has done much to bring popular notice to this 'little friend of all the world'; from Dr. B. B. Joshi, Lecturer in Veterinary Science, Agricultural College, Poona, who is an authority on the subject of Diseases of Livestock; and from Dr. Pandurang B. Mali, of the Veterinary Dispensary, Nasik, who has written two very useful books in Marathi on the subject of Diseases of Animals.

Mention must also be made of the valuable help received by the author from his colleagues of the Sangli Indus-

trial and Agricultural School, Messrs. J. C. Kincaid and D. D. Shaligram, of the Agricultural Department, under whose care there is a flourishing herd of milk goats connected with the School ; also from Rev. D. A. Patekar and Mr. A. B. Phansopkar both of whom have worked labouriously in the translation of the book into the Marathi language. Other friends, too, have given encouragement, and all this has been gratefully received.

This little book will first be published in the English language, and then a Marathi edition will be published, if the money holds out. The author makes no claim for its being a complete treatise on the subject, but simply a small guide for goat-keepers, or those wishing to keep them. He would suggest that it be studied carefully and the principles suggested be brought into use faithfully.

September 1, 1933.

J. L. GOHEEN,
In charge, Extension Service,
Sangli Industrial and Agricultural
School.

Keeping Milk Goats In India

TABLE OF CONTENTS

	PAGE
FOREWORD	i
INTRODUCTION	iii-iv
CHAPTER I. Goats' Milk	1-5
CHAPTER II. Breeding	5-12
CHAPTER III. Feeding	13-19
CHAPTER IV. Housing	20-28
CHAPTER V. Care of the Young	28-34
CHAPTER VI. Diseases and their Treatment	34-51

Sangli Industrial and Agricultural School Publications .

Series No. I. Keeping Poultry in India (Marathi).

Series No. II. Keeping Milk Goats In India

(English and Marathi).

Keeping Milk Goats In India.

CHAPTER I.

GOATS' MILK.

The lack of a sufficient quantity of Milk in the diet of a great many people in India, especially the poor, often results in their not having developed in their bodies the strength or stamina which enables them to resist disease. This applies more especially to growing children but it is also true of adults. Milk is the very best of all foods because it has in it all those different substances in suitable proportions which are required by the body for building up and maintaining strength and health.

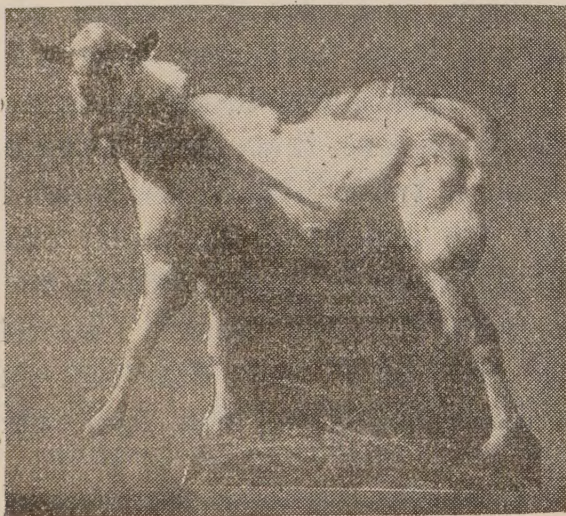
From the very earliest times the goat has been used by people as a source of milk. Even before cows became domesticated, sheep and goats were kept and their milk used for human consumption. In India today there are very large numbers of these animals, there being scarcely a village or hamlet where they are not found. But instead of their now being used so much for milk purposes most of them are kept for slaughtering purposes, or the sheep for both wool and mutton purposes. Sheep have never been quite so useful from the point of milk supply because goats have always produced more milk, although they have not been improved in this respect nearly as much as they might have been. This is a great pity, for the goat gives excellent milk and, with proper treatment might easily become the 'poor man's cow.'

Goats' milk is especially valuable because it more closely resembles human milk than does cows' or buffaloes' milk. It is also more easily digested than such milk, for the fat globules or particles in it are much smaller and can thus be more easily 'attacked' by the digestive juices than can the fat particles in cows' or buffaloes' milk. Then too, it has an alkaline reaction during digestion, which is not true of the other milk. This is a very valuable property for it helps to kill the germs found in such diseases as common colds, influenza and bronchitis. Finally, because goats eat the green leaves of many different plants in the hot weather, when there is no green grass available for cows or buffaloes, they get valuable properties in their milk from these green leaves that cows and buffaloes do not get at that time of year. In many parts of India the big strong wrestlers recognize the peculiar value of goats' milk, preferring it to any other kind of milk. Why should others not be as wise?

Some people, however, object to goats' milk because, they say, it has an unpleasant odour or flavour. True, it may have such an odour or flavour if the milk is drawn under insanitary conditions, or left to stand where impure odours exist. Another important reason for bad odour or flavour is the presence of the male goat in the near neighbourhood where milking is being done. The odour from his body is easily carried to the milk and thus spoils the milk because milk of any kind has the property of absorbing odours very readily. And the odour of the male goat is unpleasant, to say the least. Therefore, all male goats should be far removed at milking time.

Of course, *cleanliness when milking any animal is most essential*. The animal should be brushed clean and the udder carefully washed and dried, while the place where the milking is being done should be free from all filth and

rubbish of every sort. The vessels into which the milk is to be drawn should have been washed thoroughly with warm water and then 'sunned' immediately after the last milking. One's own clothes and especially the hands should be *very clean*. All this means trouble but it also means good clean milk and freedom from bad odours. Let one milk the goats in this manner and the complaint referred to above will not be heard again. In fact, it will be found that goats' milk can hardly be distinguished from cows' milk. It has a sweet wholesome flavour.



**Good Surti Buck.
Fully Matured.**

Goats, in fact, are as a rule cleanly animals more so than the ordinary cow or buffalo. Unless almost starved, they will not eat refuse or dirty garbage. They will choose only clean food. It is very rare indeed that goats are affected by tuberculosis but the same cannot be said with such confidence about the cow or buffalo. And the chief reason for that probably is that the goat is so much more cleanly in its eating habits. One is often led to think

that the village buffalo is a filthy scavenger, as one sees it eating all kinds of objectionable things. That can not be said of the goat. See for yourself if this is not true.

Another advantage of the goat is that it is a small animal requiring but little space for its keep. Goats do like exercise but if they are given only an hour or so to run about in the morning or evening, and then are kept tied or tethered all day, with food and water supplied to them in sufficient quantity, and a shady place in which to rest during the heat of the day, they will get on very well. If one has good opportunity to graze them in rough hilly country, or to let them roam about the fields after the crops have been harvested, they will enjoy such freedom. But it is not absolutely necessary. And one must be careful to prevent them from doing harm to one's neighbour's crops or trees. Again, too much freedom may mean that they are expending so much energy running about that they do not have sufficient left to produce the abundance of milk that one expects. Therefore, a moderate amount of exercise is better than too much, provided one is careful about supplying the feed and water they require.

Now, the reasons given above should be sufficient to show that the milk goat ought to be a popular and useful animal, especially amongst the poor in India. In many western countries, notably Switzerland, France, England and the United States, it is so regarded and there are a good many books and even magazines published dealing with the subject of these animals. Goats are treated with affection by many and they thus become pets as well as useful members of the communities in which they live. In those western countries there are goats that give anywhere from two to ten seers (4 to 20 lbs.) of milk a day. In India there are goats that give as much as from two to five seers (4 to

10 lbs.), but they are rather rare. An ordinary country goat will do well to give one seer, or even less. It would be possible to have many thousands more of good milk goats by paying attention to the following points ;

1. Proper Breeding.
2. „ Feeding.
3. „ Housing.

There are other matters that also need to be considered but the principle ones are those just mentioned, and they now will be taken up in the order given above.

CHAPTER II.

BREEDING.

Under this subject of Breeding the chief word that needs to be kept in mind is—*Selection*. To know how and what to select is a matter that requires study and some practical experience. For instance, Vitality, or Good Health, is an outstanding requirement for good milk goats. A weak sickly animal cannot produce either much milk or strong healthy progeny. As a rule goats are healthy animals but some are more so than others, and a weak run-down goat should never be chosen for breeding purposes. Only strong, healthy, vigorous and fully-matured goats should be chosen.

Next, there is a principle in breeding that 'like begets like', and it also is a most important one. If one wants goats that give plenty of milk one must be careful to choose those for breeding that are descendants of good milkers. Especially is this true of the male goat for it has been discovered that the male has the property of transmitting the

good qualities of his mother on to the next succeeding generation. And as a breeding male, carefully chosen for that purpose, he is able to mate many females and thus influence the succeeding generations for good through his numerous offsprings or descendants. If, in addition to having a good male for breeding, the female herself is a good milker and is descended from good milkers, the young born of such a mating would almost certainly be far better than those from a pair where the mother was not of good qualities, even though the male was a fine animal, carefully chosen for breeding. But remember, if you can not have such a fine female, make certain to choose the male very carefully, looking thoroughly into his history in order to know from what kind of stock he himself has come.

Another fact must be kept in mind, when selecting goats for breeding, and that is, there are no two descendants that are exactly alike. This is true even of those born of the very best parentage. There are bound to be some differences. For instance, one child may be larger, another female may give more milk than her sister, one may have a quiet disposition and another one be restless, and so on. It is most important, then, to be able to select those animals out of the lot that have the very best qualities, such as a quiet disposition, ability to produce an abundance of milk, good size, strong bones, an active temperament, and so on. Only the best should be chosen and all others rejected. Otherwise there will not be the degree of improvement one would wish to see. This is where experience in selecting is required, and where one must learn to be very exacting in making one's choice. One will be tempted to accept that which is not so good, but one must have a mind strong enough to resist such temptation.

Now, in applying these principles to the business of improving ordinary country goats, the first step is to find

a male that will be thoroughly suitable for heading up the herd as a reliable breeder. To do this it is best to try to secure a male of pure breed. In India there are several breeds that may be said to be pure, or so nearly so that their progeny practically always are born true to the qualities or characteristics of that particular breed. For instance, there is the Surti breed, which originated in or near the city of Surat, in Gujerat. There is also the Jamnapara breed which is said to have originated in the city of Lucknow, or in that general region; there is a breed in Hyderabad State sometimes called the Oosmanabad breed; and there is also the 'West Coast' breed which is supposed to have originated in the Malabar region. All of these breeds are noted for their good milking qualities, and there are probably other breeds which, at present, do not seem to be quite so well known.

If one should secure a good male of any one of these breeds, whose ancestors were known to be good milk goats, one could allow him to be mated to the females of country origin in one's herd with a sure feeling that there would be a decided improvement in the milking qualities of the females born from such mating. All such females should be kept and carefully raised for breeding purposes, although later on it will be found that even amongst them there will be some better than others, and when this is known, only those best milkers should be used for breeding and the others disposed of.

Not a single male kid should be kept but should early be castrated, then allowed to grow to maturity when all such should be fattened and sold to the butcher. It will pay to do this for they will bring a better price than ordinary goats—at least one should demand a better price. If such 'mixed-breed' males are kept for breeding the results are likely to be disappointing, the reason being that

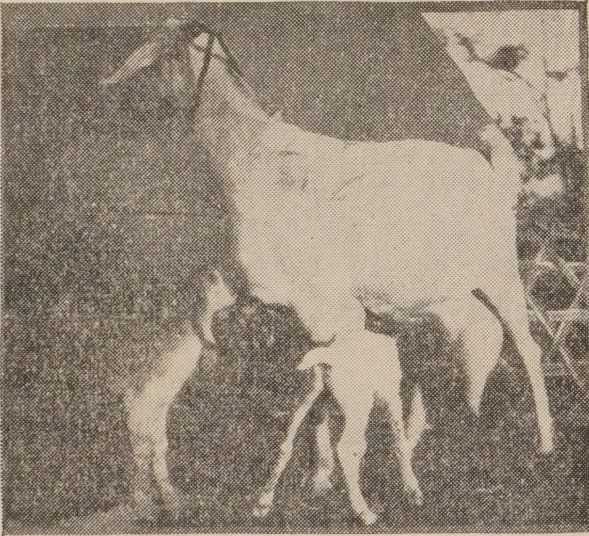
the blood flowing in their veins is far too much mixed to bring about satisfactory results. Remember that the male is the chief agent that transmits the good qualities on to the next generation. Hence always use a good pure male about whose qualities you are sure.

One good, strong, pure male whose age is three or more years can serve from 50 to 150 females a year provided he is always kept in good healthy condition. Therefore, it can easily be seen how very useful and valuable, too, a good male can be. Before he is three years of age he should not be allowed to serve more than about 30 females a year, for he is still too young and has not grown to full maturity. If, as a youngster, he is well developed and full of vitality he may first be used when he is about 8 months old, but during that first year he should serve only about 10 or 12 females. And always it is well to allow some interval of time to pass between servings, as much as two weeks or so when he is still quite young. Later on an interval of 2 or 3 days will be quite sufficient.

Another point that is quite important is, the male should always be kept separate from the females. That has already been mentioned in connection with the drawing of milk from the females, but here it has to do with the matter of breeding or mating. Keeping him separate means that he does not become unduly restive or excited, as he would if he were allowed to roam about with the herd, and thus he does not waste his energy. Then too, he need not serve the same female more than once or twice at any given time, and in this manner his energy is conserved. Only if he is managed this way will it be possible for him to serve a large number of females in a year. When a female comes 'into heat' she should be brought to the male and allowed to remain long enough only until he has served her once or twice, when she should be removed. It

will be found that she usually becomes pregnant and that no more attention from the male is required.

Of course this breeding male must have decent quarters and must be well kept, arrangements to be so made that he should have plenty of exercise every day. That means that he must in no way be neglected but must have very special care. He is a valuable animal and it would be most unwise to neglect him in any way. This brings up the point that one such male could be kept on a co-opera-



Surti Doe.
A heavy Milker.

tive basis, in much the same manner as breeding bulls are kept for the improvement of cattle in the villages. A good male will be useful for breeding for perhaps as long as twelve years, provided he is well kept and attended to. How very important, then, that he be well looked after!

Now as for the females, it may be possible to breed them as often as twice a year, because it takes just about five months from the time of mating for kids to be born.

This means that the mother goat may come 'into heat' a month or two after she has given birth, when she could be bred again. However, this would be quite a strain on her, and very special care would have to be taken to prevent her from becoming 'run down'. If she is well fed and kept she may continue to be milked up until about a month before the time she is expected to give birth again. After that she must be allowed to 'go dry', and should be given a complete rest. One must remember that she has to nourish the young that are being developed within her, as well as keep her own health and strength, and if she is still being milked she must be given plenty of food of the right sort so that she can manage to do all that is expected of her. Only by such management will it be possible to get the very best results from her and also to have her remain useful for a long time as a milk goat. So, in the case of the females it is also easily seen that proper care is a most important matter. Without it no good results can be expected.

A young female goat may first be mated when she is only 6 months of age provided she, too, is well developed and full of vitality. Of course it is better to allow her to become larger and more mature, and if she is not well developed it would not be at all wise to breed her until she is nearly a year old. The point to be made here is, that all young goats ought also to be well fed and cared for, if one wants to have them ready for breeding and milk production as soon as possible. And in this connection it is well to say that all young males should be kept separate from the young females from the time they are both about $2\frac{1}{2}$ to 3 months of age. Let all the females go out to graze together, and let all the males do the same thing, separate quarters being provided for them. Of course if the young "mixedbreed" males are very early castrated, it will not be so necessary

to do this so far as they themselves are concerned. But it will be necessary in case of all the other males.

A female goat that is about to give birth to kids should be kept in a separate stall or compartment for about a week before the time when she is "due". If she is permitted to remain with the other females there is much danger that she will suffer injury from them by being butted or knocked about by some of the other goats. If this should happen it is quite likely that her young might be born dead, or some serious injury happen to the mother goat herself. Then too, at the time of giving birth of course she should not be found in the midst of other goats who would be easily trampling the young, newly-born kid or kids. This subject will be taken up again but it is mentioned here so that it may be seen how very important it is to give special attention to the goat that is about to give birth.

In summarizing this whole subject of breeding it is pointed out that,

1. Only a good pure male of strong vitality should be used.
2. He should always be kept separate from the females.
3. He may be used for as many as 150 different services a year, if well kept and attended to.
4. A young male may be ready to use for breeding as early as 8 months of age, if he is well developed and full of vitality. This also applies to young females.
5. All 'mixed-breed' males should be castrated early, say when $2\frac{1}{2}$ months of age, and then allowed to grow to maturity, when they may be sold to the butcher.
6. Only the very best females, noted for their good milking qualities, should be kept for breeding purposes. Other females should be sold, if one wants to make rapid improvement in one's goats.

7. A female goat may be bred as often as twice a year, provided she is very well looked after, and given at least a month's complete rest before her next kids are due.

8. A female goat, which is about to give birth, should be kept separate from the other goats for at least a week before the time she is "due," and it would be well to do this for about a week thereafter.

9. All young male and female kids should be kept separate from the time they are about $2\frac{1}{2}$ to 3 months of age unless the "mixed-breed" males have been castrated.

10. This whole subject of breeding requires that all of the goats, both males and females, have the very utmost of good care and attention. This applies to young as well as old. Only by good attention and careful management will it be possible to get the best results and thereby profit the most from one's goats.

SPECIAL NOTES.

If the system of breeding described in this chapter is followed, viz. that of breeding females of country origin, and their succeeding generation of daughters, only to pure-blood males, one will have succeeded in securing pure-blood goats of the same breed as the males used by the time the eighth generation has been reached. By that time the male goats may be kept for breeding, if so desired.

2. Painless castration of young kids, and of older males too, can easily be done by use of the Burdizzo castrators. There is a special small size available for sheep and goats. All veterinary doctors know about these castrators and, if asked, they will doubtless be glad to use them. It has already been pointed out that male goats should be castrated early, say when about $2\frac{1}{2}$ months of age.

CHAPTER III.

FEEDING.

In an agricultural country like India the subject of feeding milk goats need not be a very difficult one. Any one who observes can see that goats eat a great many different kinds of green leaves; also pods from bushes and trees; such as the pods of the Babbul (*Acacia Arabica*); grass and fodder; and different kinds of grains or seeds. Occasionally they will even nibble at paper, cloth and such articles, but unless they are exceedingly hungry, due to neglect in feeding, they will not touch dirty things. Even human beings, when on the verge of starvation, have been known to eat objectionable things. It has been stated above that goats are very cleanly in their eating habits, not even touching articles that have been left by or trampled upon by cattle. They can tell by their sense of smell very easily about that.

Because of their cleanly habits not so many disease germs are likely to be found in their blood or digestive systems. This is a very important fact. Give them good, clean, nourishing food and they will be very likely to keep good health. Their drinking water should also be very fresh and clean, available when they want it. In the hot weather it should be kept in the shade in a cool place so that they may be refreshed by it. It is well to remember that, without plenty of water, a goodly supply of milk is not possible, nor will good health be maintained. But let the water be clean, for filthy water is always a source of danger because of the germs it may contain. Cleanliness, then, in both their feed and drink is most important.

Another point to keep in mind is that different kinds of foods have different properties. And the body needs

many different kinds of foods because it has so many different kinds of duties to perform. So, without a proper supply of different kinds of foods the body cannot be expected to perform all of its duties in the most efficient manner. The production of milk requires that different kinds of foods be eaten in sufficient proportions, because milk has in it a number of different properties. If a milk goat had only dry grass to eat it could not manufacture much milk, but if it also had green leaves and certain kinds of grains, plus a sufficient amount of drinking water, it ought to produce much more milk. It must have enough food in the right proportions to maintain its own strength and then have enough with which to manufacture milk.

The feeding of green leaves or green grass of some sort is always an important item in the daily ration of the goats. The succulent juices of the leaves and small stems help to maintain a good milk supply, and the fact that goats eat such leaves in the hot weather, when perhaps green grass is not available for cattle, means that they are likely to have more milk proportionately to cattle at that time of year, as well as better milk. If goats are allowed to browse around in waste hilly land they will doubtless be able to eat many such leaves. If not, such leaves as those of the Babhul or Banyan trees, or of the Shevari (*Sesbania aegyptiaca*) plant, should be brought and hung before them.

Then too, they might have dry grass or finely cut-up pieces of fodder, and also there should be some grains, or by-products of grains, such as chaff or hulls, wheat bran or husks, or the broken kernels of horse gram, given to them morning and evening. A mixture of wheat bran and such cereal as bazri, or instead of bazri some other cereal like jowari, in the proportions of half and half by weight, has been fed to good advantage morning and evening at Sangli.

Each goat has its own small box or container for holding the mixture and it is put before them at milking time when they eat it very happily. The amount for any one animal varies with the amount of milk she gives, her age and size, but roughly each one gets about half a pound of the mixture at a time.



Young Surti Doe.
Soon to have first kid.

When the pods of the Babbul trees are available they may be fed in these same containers morning and evening, and the amount of other grain feed may be cut down somewhat. In like manner the leaves and stalks of dried ground-nut vines may be fed in the containers and a good deal of the grain feed can thus be saved because these leaves and stalks, or those of similar varieties of plants of the Legumes, are very nourishing. The grains, or by-products

of grains, are called concentrates while the other coarser feeds are called roughage. And as has already been stated, goats should have feeds of both classes every day.

The use of the boxes or containers mentioned above is important. The reason is that sheep and goats are subject to attack from small worms, "stomach worms." Other worms that live in the intestines are also likely to be found inside the goats. All these are thieves or "parasites," because they live upon the food that the goat has eaten and which now is being digested. If goats have not been fed according to sanitary methods it is almost certain that such worms will be found inside them, because the worms themselves, or their eggs, stick to foodstuffs that have been thrown on the ground; the small worms, and especially their eggs, are not at all likely to be seen, but they are very prevalent in India and are one of the very worst enemies that goats have to contend with. By keeping the food boxes or containers always clean and by using them faithfully for all feeding, one can avoid having one's goats become contaminated with such worms. The ordinary iron basin (पाटी) makes a good container for such feed.

All green feed or roughage should either be tied into a tight bundle and hung up before the goat, or else there should be constructed a special manger into which such feed can be thrown. This must be so made that the goat cannot possibly get into it herself or into any way spoil the feed with her droppings. Such a manger can very easily be made of split bamboo, the point being to so construct it as to allow an opening large enough only for the head of the animal so that she may reach in and get her mouth to the roughage. All left-over green feed that has become wilted should be removed from this manger and it is important to keep it clean also, for it may become the hiding place for vermin and other undesirable creatures. Remember that

an ounce of prevention regarding all these enemies is worth many pounds of cure because it is exceedingly difficult to remove worms from a goat that has once become infested with them. They multiply very rapidly in the body of the animal and often cause the goat to become so thin and weak that she is scarcely able to stand, let alone give any milk.

Goats ought to have salt to lick for they require mineral salts in their body in the same way that human beings require such salts. The lumps of rock salt that can be bought in many bazaars are just the thing for them. These lumps of salt, of fairly good size, should be kept hung up in some suitable place where the goats can easily get at them, or else they may be kept in the manger. One can be assured that the goats will lick them with much satisfaction. The salt often helps to tone up the system and may even have some effect in removing worms from the body. Therefore it is the part of wisdom to supply these lumps of salt and keep them always where the goats can readily get at them. Ordinary small crystals of bazaar salt should not be given, for they cannot be licked so easily, and hence there is danger of too much being consumed by the goat at any given time, and that may cause much trouble.

There are a few other points about feeding that should be kept in mind. First, no wet grass, fodder, or leaves, should be fed to the goats when in that wet condition. Such leaves or grass should always be put out in the sun to dry off, and then placed before the goats. Next, in the beginning of the monsoon, when the fresh new grass is sprouting, one should be very careful about allowing goats to eat the grass. Small quantities may be eaten at intervals but if too much be eaten at any one time, there is much danger.

that it will cause swelling. Therefore one must be very careful about this feeding of new green grass.

Finally, there should be regularity in feeding. The digestive system becomes accustomed to carrying on its work at regular times, just as human beings like their periods of rest. One should feed regularly at least three times a day—morning, noon and evening. And only enough should be given at any one time so that the goats may eat all up in half an hour or so. Thus, wastage of feed will be avoided and expenses can be kept down, and the goats will know when to expect their meals, eating with a relish that which is put before them. Regularity, then, is an important point always to be kept in mind.

Summarizing what has been stated above on the subject of feeding the following points have been brought out.

1. In a tropical agricultural country like India, with so many different kinds of feeds available, one should not have a difficult time feeding one's goats.
2. Cleanliness in feed and drink, however, is a very important matter and should never be neglected.
3. The feeding of a variety of feeds is an important point, because, different feeds have different properties, and the body has many different needs to be supplied, while the production of milk requires many different substances. Therefore, considerable coarse feed or roughage is required, while grains or their by-products, called concentrates, are needed in lesser quantity.
4. It is always advisable to furnish green leaves or green grass each day for such succulent juicy articles help to develop a good supply of milk, and also keep the body in healthy condition.

5. Boxes or containers for grain feeds, or concentrates, are very necessary, while there should be a manger into which all coarse feed or roughage should be placed.

6. Goats require salt and one of the best means of furnishing that is through the lumps of rock salt that may be secured in a great many of the bazaars.

7. Leaves or grass in wet condition should not be fed to goats. All should be dried off first before feeding. Likewise, in the early monsoon when the new grass is very fresh and tender, it is dangerous to permit goats to eat very much of it at any one time. In other words, it should be fed very sparingly.

8. Regularity in feeding is a most important point. There should be about three set times a day for feeding, and only enough should be given at any one time as may be eaten in half an hour or so.

SPECIAL NOTES.

1. The general opinion that anything is good enough for a goat is a mistake. Goats will do best on good food and one should make a study of this business of feeding them, so that they may keep well and strong and furnish a good supply of milk.

2. A warning should be issued against the use of stunted and *immature jowari* (Kafir Corn) fodder in green condition. It is likely to have in its juices a strong poison, while in that condition, and the eating of such fodder will prove to be injurious to the goats.

CHAPTER IV.

HOUSING.

The subject of providing living quarters for goats need not be a very serious one, in a warm tropical country like India. Two or three points need to be kept in mind ; first that shelter is required against excessive heat and inclement weather ; next, protection from thieves and predatory animals, like the wolf, is essential ; and third, there should be freedom from all kinds of vermin and pests that give so much trouble to goats. In short, furnish your goats with a place where they may be dry and comfortable, safe and secure, and free from vermin, and you will have done for them all that they require in the way of housing.

A wide-spreading shady tree may be sufficient in the way of housing arrangements, where the climate is dry and mild, and where there is no danger of loss from thieves or animals. Such an arrangement will cost nothing, and if kept clean and dry, ought to be satisfactory under the conditions mentioned. However, if one also keeps a male goat it will be necessary to have a separate spreading tree for him, because it has already been carefully explained that the male should always be kept separate from the females. Let him also have his nice spreading tree, and make all conveniences for his feeding there just as satisfactory as they have been made for the other goats, and the chances are that all will go on very nicely. The little kids can be kept under the large inverted type of basket that shepherds use for keeping the new-born lambs, and they will get on very happily in that until they are old enough to run along with their mothers.

Probably most of the sheep and goats in India to-day are kept under some such conditions as described above.

except that there is no segregation of the males from the females. No doubt a good many of them have even more covering over their heads in the form of a thatched roof, or something like that, and that is an important point, for goats should always be protected from dampness. It is true that they may get wet when out grazing in the rain, but their quarters should be located in a place where there is good drainage—a place that is high and dry. Dampness in the living quarters brings on colds and these may later on develop into pneumonia, one of the few diseases to



A = Iraqi Doe.
Short ears characteristic.

which goats are quite susceptible. It is very important, then, that the floors, especially, but also the sides or walls of the quarters, be kept as free from dampness as possible.

If weather conditions are not favourable, or if there are nearby jungles where wolves or panthers are likely to exist, then it is highly desirable that there be strong and

well-built quarters for the goats, otherwise one may suffer no small amount of loss. The shed or building required need not cost a great deal of money but one should spend a good deal of thought as to its construction. It should have sufficient room in it for the goats one intends to house there; there should be proper arrangements for feeding, and possibly for the storing of feed, unless one intends to store it elsewhere; as stated above dampness must be kept out, also all other enemies; there should be good arrangements for draining out the urine, so that it may collect outside; and if one intends to keep a male goat for breeding he should have either quite a separate compartment well shut off from the other goats, or else a special shed of his own. All this, then, requires careful planning.

The size of the building will naturally depend chiefly upon the number of goats one intends to keep in it. Roughly speaking, about 10 to 12 square feet are required per animal (say a space $4' \times 2\frac{1}{2}'$ or $3'$ in size), this not including the space in front of each animal for the manger but simply enough space for the body of the goat itself. The manger should not be less than 15" wide, and each goat should be allotted as much space in it as is allotted for the width of body, viz., $2\frac{1}{2}'$ or $3'$. If there are a good many goats to be kept it will be well to plan for the gable-roof type of building. It should be made wide enough for two lines of goats, facing each other, with the manger in between the lines. This should mean that it would be not less than 10' wide, and if it were made 12' that would be better. The length would depend on the total number one intended to keep. The height of the roof should be at least enough to permit one to walk about erect without danger of hitting one's head. Care should be taken to see that there are no leaks in the roof, also that the slope is sufficient to drain the water off rapidly.

It would be well to raise the floor of this building at least 6" above the level of the ground outside. In addition to that the floor itself should have a decided slope downwards from the manger to the sides of the building, there being a drop of at least 3" from the manger to the edge of the space allotted for the goat. That would mean that the manger should be not less than 9" higher than the level of ground outside. This floor should be made of earth well tamped down so that it will not give way to the stamping of the goats as they stand in their individual stalls. All around the inside edge of the building there should be a good drain leading to a pit outside where the manure and urine are to be stored. This drain or gutter should be well made so that the urine does not sink into the ground within the building but does actually flow out to this pit.

Materials to be used for this building may be such as suit the conditions of any given locality. It will be advisable to have walls constructed on that side or those sides from which the prevailing rain and winds come. The other side or sides may be enclosed with some strong kind of wire fencing or some other light and suitable material such as will insure good ventilation. There probably need be only one door to the building and it may be located in the most convenient place, while windows may or may not be constructed according to the conditions of the particular spot. It will be advisable, however, to allow sunshine to enter the house, particularly in the mornings, and as stated above, it is very necessary that there be good ventilation. If the building is made secure so that thieves or predatory animals can not enter, and vermin has little or no chance to hide, one may feel quite well satisfied with the building. It may have cost little or much, but it should have in it the requirements and specifications, simple as they are, mentioned above.

It will be far better to have the male goat housed in an entirely different building, and one that is located about 50' at least distant from the other goats. He is to be kept there off by himself, consequently he should have quite a good deal more space than was intended for the females in their home. His house may be shed-type roof, (roof sloping one way) for this will be cheaper to build. It should be at least 8' wide and as many feet long for he should be allowed to have a fair amount of freedom in this house. Furthermore, at breeding time the females should be always brought to him. The floor should be raised, as stated above, and there should be good ventilation, also chance for the sun to shine in each day. The manger may be built along one side of the house. It will be well if this shed is so placed that the male goat will not have occasion to see the other goats—at least he should not see them frequently because that will cause him to become unduly restless. He will be much happier and keep in better condition if he lives his own quiet life.

There should be an enclosed run adjoining the main house where the young kids may be let out each day for play and exercise. This run normally should be longer than it is wide, and it should be so constructed that the kids may be perfectly safe from outside enemies, while they themselves must not be allowed to get outside. If some large rocks are available, or failing them, some stumps of trees or similar objects, these may be kept in the middle of the run so that the kids may climb or jump upon them. They delight in such play and it is excellent for them. It would be well also to have several trees inside or near this run so that there be good shade for the kids. They should not be exposed to the hot sun during the noon hours of the day.

The male goat ought to be provided with a run in a similar manner, and in it there also ought to be some objects

on to which he can climb or jump. This is especially important because ordinarily he will not be allowed out to graze, unless he should be taken to some separate spot and tethered there. It is quite all right to do that provided one is careful to see that he is securely tied, also that he has shade for the noon hour. In any case, however, it is advisable that he have his own run.

Goat manure is very valuable and one will find that there will be good demand for it, if indeed one is able to spare it. Hence it should be carefully stored. For this purpose a pit is necessary. This pit should be fairly deep, say not less than 3 feet, while it also ought to be 3 or 4 feet wide, and as long as the number of goats one keeps should indicate. The pit should be located rather close to the main house so that the urine may be drained into it. The goat droppings and sweepings from the stable should be thrown into this pit systematically. By that it is meant that one should begin to fill the pit from the end nearest the house, and see that a section there is filled up level with the surface of the ground when that section should be well covered over with the top soil from the pit, and a new section begun in similar manner. The sealing up the pit this way means that no valuable gases are allowed to escape, also that the manure rots more quickly and its several ingredients become more easily available to the crops once it is taken out and put into the ground. Furthermore, by covering the manure there is far less danger of stable flies finding a nesting place. And it is important that these be kept from infesting the goat stable.

Points to be noted, then, in connection with housing may be summarized as follows :—

1. Where the climate is favourable, goats may be kept under wide shady trees, provided of course that there are no wolves or panthers about.

2. Good drainage is essential where the goats are kept, for dampness is a source of great danger to them. Cleanliness is most important also, and for this purpose the location of a manure pit near the stable, into which the urine may drain and all sweepings may be thrown is a very necessary part of the equipment.

3. If for the sake of more security and protection a building is required, this building should be 10' or 12' wide with a manger of 15" width running down the centre, the goats to be tied on either side, and 10 or 12 square feet allotted to each goat.

4. The roof of such a building should be gable-type high enough to insure plenty of space for the care-taker to move about freely. The walls should be so constructed on the sides from which rain or winds come as to keep out dampness, and the floor should be raised at least 6" to 9" to insure good drainage. There ought to be good ventilation and it would be well to arrange so that the morning sun can shine into the house.

5. The male goat should have a special shed or building of his own located at some distance from the building in which the other goats are kept. This shed should be at least 8' wide and as long or even longer than wide. It may have the roof sloping one way, and the general arrangements of the floor, ventilation, manger, etc., should be as good as in the other building.

6. Runs should be provided for the kids and the male goats, each adjoining its own building, and supplied with some sort of objects upon which the animals may climb or jump. Good shade also is essential for these runs.

SPECIAL NOTES.

1. In the main building, room should be set aside for female goats that have given birth or are about to give birth to kids. It would be well to have one or more special compartments separated off for this purpose, each to have sufficient space for some free movement for the mother goat and her kids. Such compartments might be 4' by 5' or 6'. There might be also kept one similar compartment for growing kids, it to be of similar size. Failing that kids could be kept under the inverted type of basket that shepherds use, during the night in some vacant corner, and turned loose in their run during the day-time.



Pure Swiss Goat.
Female of Saanen Breed.

2. An ideal stable would also allow for a special space in which the milking is to be done, say an earthen platform near the door and raised about one foot above the general level of the stable floor. This platform should be

4' long and $2\frac{1}{2}$ ' wide, and there should be a small manger at the head end where the goat may be tied and fed while the milk is being drawn. A low table or long stool of similar dimensions would probably be just as serviceable as the permanent earthen platform.

3. As has already been pointed out it is most important that the mangers be kept clean and that there be no place for vermin to hide anywhere in or about them. The walls should be high enough to keep the goats from stepping into the feeding place, while the tying arrangement should consist of a swivel ring fastened to the ground on the outside where the wall joins the floor. Only enough rope should be given to permit of the goat getting her head well down into the manger.

CHAPTER V.

CARE OF THE YOUNG.

In the chapter on Breeding, it was pointed out that the female goat should have special care during the period that she is "carrying" her young. That is the time when the care of the young should begin, for it is most important that the mother goat be given every opportunity to give birth to healthy, normal, fully-developed kids. It was pointed out that the choice of the parents has a very great deal to do with the kind of young that are to be born and this reminder will serve to keep fresh before one the need for selecting the parents and for giving the mother goat a proper chance to bring forth such kids as will be an improvement, even, over their parents.

Most female goats make good mothers, attending well to the cries of their kids. If only one kid is born it is a

simple matter for her to feed it. If two or three are born it may be necessary, especially when they are very young, to see that the weakest or smallest of the lot has an opportunity to get sufficient milk, because the stronger ones may not give it a chance to do so. Generally the male kids are larger than the female, hence they will be able to push the smaller ones away.

The mother goat should be kept in her special compartment for about three or four days after giving birth to the kids, after which she may be allowed to go out with the others for grazing. The kids will want a drink of milk about every five or six hours, at least for the first week or two, and arrangements should be made so that the mother may have access to them at such intervals of time. When they are about two weeks old they will begin to be interested in nibbling at green feed or dry fodder, and it is well to make some arrangement whereby they may easily be able to get at small quantities of such feeds.

It is also advisable to make some arrangement whereby the kids may have an opportunity to be out in the open air and get some sun-light each day, especially about mid-morning or mid-afternoon when the sun is not too hot. For this purpose one of the large inverted baskets used by shepherds for small lambs is very suitable and not expensive. The green grass or fodder can be tied in small bunches to the sides or top of this basket, and the kids will play about or jump up to get at this feed. During the heat of the day a blanket or covering of some sort should be put over the top of this basket in order to provide shade for the kids.

Now, it is important that this basket be moved about from place to place at intervals of every two or three days, so that the droppings of the kids will not contaminate the soil too much. If that is not possible, great care should

be taken each morning to sweep up all of the droppings most thoroughly and thus keep the place very clean. This point cannot be emphasized too much. Young kids and growing goats are subject to the infestation of several kinds of worms (generally called "internal parasites"), and once these enter into the stomachs and intestines of the animals it is very difficult to get rid of them. Therefore the matter of cleanliness in their quarters and in their feeding is of very great importance, for that will be the best means of preventing such infestation.

When the kids are about a month old they may be fed at longer intervals, say as much as 8 to 10 hours apart. And they may be also allowed to go out with their mother to graze. In order to keep them from taking milk from her in between their regular times, it is well to cover the udder of the goat with a bag which is to be tied up over her back with long strings. This bag should be kept clean, and should be tied securely so that it may not be lost or pushed off by rubbing against a tree or bush. The kids should be offered good fresh water to drink when the other goats are watered, and they should have opportunity to lick the salt lumps in the same manner as the other goats.

If it is not advisable for any reason for all the kids to go out grazing, they must then be provided with a special run, as was mentioned in Chapter Four. As every one knows, kids are very playful little creatures, and it is highly important that they should be allowed to have plenty of exercise every day. Such attention to these little details will mean much for the proper growth and development of the kids.

When the kids are about $2\frac{1}{2}$ to 3 months of age, the evening drink of milk may be dispensed with and when they are 4 months of age they should be weaned away from

milk altogether, because by this time it will be possible for them to get along on solid feeds such as the older goats eat. However, if for any reason anyone should wish to allow his kids to keep on drinking their mothers' milk until they are 5 months of age, no harm will have been done, although it is by no means necessary that they keep on that long.

It is well to recall the fact also that all male kids, unless castrated early, should be separated from the female kids when they are about $2\frac{1}{2}$ months old. If they are castrated there is no harm in allowing them to remain with the other kids. If not castrated it is a mistake to allow the males to remain in the same place with the females. Such males should have their special run, and their special place in the stable, and very good care should be taken to see that their growth and development are in no way hindered or stunted.

It is a good thing to be friendly and playful with kids as they are growing, and to train them thus to have perfect confidence in their master. Such an attitude of confidence and of friendliness will mean much in their management because goats so trained will be obedient and easy to handle. Furthermore, because they trust their master they will be much more likely to have quiet dispositions, a point which is of much value both with the male and female goats. A little extra care in keeping goats happy and healthy will count for a very great deal from the time they are born until they die.

Summarising the few special points connected with the Care of the Young, one should remember :

1. That there should be special quarters for the female goats about to give birth, also that the mother goat should

have some special care and attention while she is "carrying" her young.

2. That most female goats make good mothers, but that if there are two or more kids born it may be necessary to take special care in seeing that the weakest or smallest have an opportunity to drink and are not pushed away.

3. That the mother should be kept confined in her special compartment for about four days, after giving birth, when she may be allowed to go out to graze with the other goats. She should be permitted to return to feed her kids at intervals of about every 6 hours during the first two weeks of their lives.

4. The kids should be kept out in the open air and sunshine for a few hours each day, an inverted basket being quite satisfactory for this purpose, or else they should have a special run of their own. Shade is necessary in the heat of the day.

5. Absolute cleanliness is essential in all of the living and feeding arrangements of the growing kids. Arrangements, too, for play and exercise are also very necessary.

6. After the kids are about a month old the intervals between feedings from their mother may be increased to 8 or 10 hours, and at the time they are $3\frac{1}{2}$ months of age the night feeding may be stopped, while all feeding from the mother should be stopped at about 4 months of age. When the kids are two weeks old they should be encouraged to start eating solid food, and from that time on the amount of such food should be gradually increased.

7. It is well to remember to separate the male kids, such as are not to be castrated, from the females, when

they are about $2\frac{1}{2}$ months old. All castrated males may be allowed to run with the females.

8. Treating the kids in an affectionate friendly manner is important. Goats will become very obedient, and it is possible to train them to do many useful things.

SPECIAL NOTES.

1. The compartment where the mother goat is kept should have in it a good bedding of dry straw or leaves at the time the goat is about to give birth. This is necessary both for the mother herself and the new-born kids. It is also most important to keep the udder of the mother



Pure Swiss Goat.

Male of Saanen Breed.

goat free from all dampness and draughts of cold air when she is "fresh" and her udder is very tender. For this purpose bedding should be always supplied to her for the first two or three weeks.

2. If new-born kids are unable to suck the milk from their mother's teats for any reason, they may be taught to drink out of a shallow vessel, first by letting them suck one's finger that has been dipped into such milk, then later by pushing their mouths gently down into the milk itself. Only small quantities of milk should be fed this way, never more than a pint at a time. Because it is so easy to get this milk, without any sucking or effort, the kid will want more than it should have. Hence only a small amount should be given at a time, and absolute cleanliness every-where is essential, if this method of feeding needs to be done.

CHAPTER VI.

DISEASES AND THEIR TREATMENT.

It is probably largely because goats themselves are such clean animals, preferring clean food and quarters to spoiled food and dirty quarters, that they are generally so free from diseases or ailments of one kind or another. And it is largely because man, in his care of these animals (or perhaps more truly lack of proper care), does not see to proper cleanliness or sanitation, ventilation, etc., that goats do occasionally suffer from a comparatively few ailments.

Now, one must learn to take a constructive attitude towards this matter of disease or bad health. One must never forget that it is far easier, in the long run, to keep one's animals healthy and strong than to cure or even attempt to cure animals that have become sick. In other words, the old proverb, "an ounce of prevention is worth a pound of cure" is so very true that we do not take to heart

the fact that the cost of trying to cure sick animals, both in money, effort and time, not to say worry and concern, is generally so great that we only learn the truth of this old saying after we have suffered from sad experience.

But why suffer that sad experience when it all might be avoided by learning to co-operate with the goats in keeping strong and well? 'Dirt breeds disease' and filth and foul quarters bring on trouble and sorrow both for human beings and domestic animals. The goat would like to eat clean food and stay in clean, well-ventilated quarters, and he would like to have an occasional bath in warm sunny weather. Then why not co-operate with him or her in this matter of enjoying good health?

This fact of the preventing disease through proper care is so very important that it must be WRITTEN LARGE and CLEAR and kept constantly before one's mind so that it may never be forgotten. The people of India must learn to co-operate with each other, with nature, and even with their domestic animals, such as goats, in this most important matter of cleanliness. It is only by so doing that much loss from diseases can be avoided and many pests that attack both animals and human beings can be kept away.

At this point it is necessary to emphasize another principle that is very important in the care of one's goats and that is, whenever any goat becomes sick, it is advisable to remove it from the others and keep it in some quiet, separate, well-ventilated place by itself. If the trouble is only a wound or some such injury, such removal may not be necessary, but if one is not sure just what is wrong, it is far better not to take any chances but to take it away as soon as possible. For this purpose it is desirable that there be some special room or place to which sick goats can be

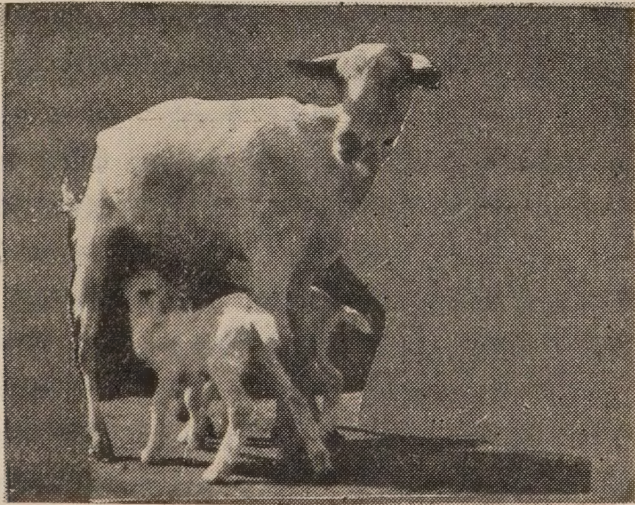
taken. If no such room is available, a special place under some shady tree, or on the corner of some veranda, where not too much sun will shine and where there will not be strong breezes should be chosen, and good arrangements made for the sick goat or goats there.

When watering sick animals the vessel in which the water is offered to them should not be used for the other goats, and one should be most careful about keeping one's hands, feet and clothing very clean when attending the other goats, after one has perhaps first attended to the sick one. A number of diseases are spread simply by the touching of articles that have come in contact with the sick animal. It is because of this that separate quarters and special vessels for feeding and watering, and the keeping of one's hands, feet and clothing so clean, are necessary. And even in the treatment of wounds, cleanliness is very necessary of course.

Still another point that needs to be emphasized is this, that sick animals often are not able to eat or digest the feeds that healthy animals are able to eat and digest. Not only that, but because they are likely to be weak, they will require more frequent feedings, but much less at a time. As they begin to feel better and regain their strength they will be able to eat more substantial feeds, but until that takes place it is mere waste of food and money to offer them the usual feeds. They must have nourishing food that can easily be digested, and that only in small amounts but at rather frequent intervals. Just as this is true of human beings, so it is true of sick goats.

In short, sick animals require good nursing and attention because so very much depends on such care to make them well. Many people have the idea that simply the dosing with medicines will be all that is necessary, but

that is not the whole thing by any means. Very often the care that is given to sick animals may prove to be far more important than the giving of drugs or medicines. This all goes to show how very important it is to keep the animals well and strong. If one has to look after a sick goat or goats, the chances are that one may not have so much time to attend to those that are well, and yet it will never pay to neglect them. One must depend upon them for the daily supply of milk, and for future income. Why then allow sickness and disease any opportunity to enter one's herd ?



Cross Surti-Swiss Doe.

If there is sickness or disease or any kind in the neighbourhood, one must be most careful not to permit one's goats to mingle with other goats, or even to graze or roam about where any such sick goats have been. It will be far better to keep one's goats tied in their stable and to take special pains to provide them with fresh clean feed and water, and for exercise to turn them loose in the run or runs adjoining their quarters. A little money spent on the objects mentioned in the Chapter IV, such as stumps

of trees or rocks, or even old boxes for the goats to climb and jump on, will mean that they will play and get good exercise, and one will not run the risk of having the disease in the neighbourhood attack one's herd.

Now, in a small book like this, it will not be possible to go with very much detail into the subject of the several diseases or troubles with which goats are affected. It is the intention to treat only of the most common ailments that affect goats, and that perhaps at not great length. That is why so much emphasis has been placed on the subject of Prevention of Disease, that in addition to what has been said above. In the Marathi language there is a very good book on the subject "A Manual of Cattle Diseases", and so much that has been stated in that book is applicable to diseases and ailments of goats because very many of the troubles that bother cattle are found to be common to goats. It is true that goats are smaller animals, hence the amount of medicine required for the treatment of cattle, as indicated in that book, will be too much for goats. It will be safe to go on the understanding that one quarter of the amount mentioned for cattle will be sufficient for adult goats. It is recommended, however, that all goat keepers should get a copy of that book and *use it*. The descriptions given are very good and one can get much help from it.

In the English language there are several books that may be had, a list of which will be given in the English edition. However, whether one has books or not, if there is a veterinary doctor in the neighbourhood and one has any trouble with one's goats it would be well to consult him at once, taking along the sick goat or goats to the dispensary so that he may see them at first hand. Such expert aid may not be available in all places but wherever it is available

it should be carefully followed. Do not delay in securing such aid, for delay often means defeat and death. And this point applies to the treatment if one has to depend on one's self and one's books for aid. Try to find out at once what is wrong, and then begin *at once to apply the treatment.*

It is well to keep in mind also just what a healthy goat looks and behaves like. One will notice that its eyes are bright; that its coat of hair is sleek and smooth, or shiny; that it is active and has a good appetite; that its droppings are in the shape of little hard balls of dark brown colour and are passed at rather frequent intervals; that its body temperature is just about the same as that of human beings to the touch, (it is really higher by about 4 degrees but this is hardly noticeable); that it chews its cud while resting; and that it enjoys its exercise or time of grazing with a good deal of relish. These are some of the noticeable features of a healthy goat, and any departure from such looks or behaviour will give at least some indication of ill-health. One ought to form the habit of noticing one's animals very carefully each morning, and if one sees anything abnormal in the looks or actions of any one in the herd, care should be taken at once to separate that one and then examine it thoroughly to try to find out what is wrong.

The following diseases or troubles of goats will now be taken up; Pneumonia, Worms, Pox, Caked Uddes, Indigestion, Diarrhoea, Constipation, and Sore Teats. For their treatment it will be advisable to have on hands the following simple remedies:—Caster-Oil, Epsom Salts, Mustard Powder, Copper Sulphate (Blue Stone), Turpentine, Phenyle, Dried and Coarse Tobacco stems, and Iodine and Iodine ointment. All except the last two ought to be available without much difficulty, and even the Iodine can

probably be easily had in all or nearly all bazaar towns today. Ordinary cooking oil (sweet oil) should also be available, but it is not specially mentioned as it is to be found in every household.

Pneumonia is one of the commoner and more dangerous of the troubles that attack goats. It may be the outcome of an ordinary cold, while it also may be induced by travel in a railway train under unfavourable conditions. The animal will have a high temperature, which may have been preceded by a chill. There will be loss of appetite, hard breathing, sometimes a cough, and the appearance of suffering. Such an animal should immediately be removed to some dry, warm place where there will be plenty of fresh air and no strong draughts. A piece of old sacking or some such warm material should be tied over its back and around the chest, and it should be kept warm and quiet. A paste made of mustard powder and water, and spread over the back next to the ribs and under the body just behind the front legs, should be applied just as close to the skin as possible. In half an hour it should be removed. In order to keep it on it will be necessary to tie it on with newspaper and then cover that over with the sacking very securely. It must not be allowed to remain longer than one-half hour, otherwise it will blister the skin.

A goat sick with *Pneumonia* will need very careful and constant nursing. It will want plenty of water to drink, and it will be well to try to maintain its strength by feeding warm milk with which a little thin wheat "Kanji" or porridge has been mixed. No dry or hard feeds should be given until it is practically well. A dose of Epsom Salts, one large spoonful to a quart (seer) of water, should be given every other morning and great care should be

taken in keeping the place clean. Feeding of the soft or liquid nourishing food should be in small quantities and at rather frequent intervals. Careful nursing may bring about a cure.

Worms found in the digestive tract of goats may be of several different varieties. In fact, there are far too many different kinds, and all kinds are very troublesome. They all are due to lack of cleanliness in the feeds or quarters where goats are kept, or even sometimes to the contamination due to constant use of the same field or grazing plot. The importance of good sanitation and cleanliness in all that has to do with goat keeping can not be emphasized too much. Once goats are attacked by worms it is very difficult to get rid of them, even with the most careful treatment. They multiply rapidly and cause weakness, so that the animal may have a good appetite, but appears to become weaker and very sick, or else it may not appear so sick but have a rough untidy coat of hair, ribs showing and a swollen belly, eyes sunken occasional attacks of diarrhoea, and a general attitude of weakness. If this trouble is worms, as it probably is, it must be checked, otherwise the animal will probably become weaker and waste away.

Now these worms do not always show up in the droppings because some of them, the stomach worms for instance, are quite small and not easily seen. The tape worms come out in pieces or segments and such small pieces may easily be hidden in the droppings. Round worms of goats are also small wiry-looking, and cannot be noticed easily. And so, it may be possible to miss seeing any such enemies in the droppings. However in order to make certain it will be well to collect some droppings and mix them in a small quantity of water, being

careful to break up the pieces so that everything will be in solution. Then this mixture should be strained through some old cloth and spread out in bright sunlight. It will then be easy to see the worms, for they will be separated from the droppings. If one does not find any the first time, it will be well to repeat this process more than once, because sooner or later the worms are very likely to be found. Growing kids are especially likely to be bothered with worms, once they begin to nibble at grass or fodder. One should be very careful, then, to be on the look out for this trouble with them, especially if their growth does not seem to be normal.

For the treatment of this trouble one should take one-half seer of coarse tobacco-stems and steep them (allow to boil very slowly) in two gallons of water (half an oil tin) for 3 or 4 hours in the evening, and allow this solution to stand all night. In the morning the stems should be strained out and only the clear cool solution is to be kept. No feed or water should be given to the goat or goats the night before, because it is important to starve the worms also. Now, take one ounce ($2\frac{1}{2}$ tolas) of copper sulphate from which all white crust has been removed, break it into small pieces and dissolve it in 3 quarts (seers) of water. This should be done in an earthen vessel or a white enamel one, brass or metal vessels not to be used. Then equal portions of the tobacco solution and the copper sulphate should be mixed together.

A long-necked bottle is necessary now for the giving of this medicine. Put nine large spoonsful of the above mixture into it for a goat 2 or 3 years of age; for a goat one year old, 6 spoonsful will do; for one month old, 4 is the right amount, and for a kid 3 months old, 2 spoonsful is sufficient. The mouth of the bottle should be care-

fully inserted into the corner of the mouth of the animal, the neck being held over the tongue with the head of the animal held level, and the bottle itself also about level. The mixture must be given very slowly so that there will be no danger of choking, otherwise there may be very serious consequences. No feed or water should be given for 3 or 4 hours, but Epsom Salts should be given, one large spoonful to an adult goat and about half that amount to kids, the bottle to be used for giving it just as for the warm mixture. Probably a half hour or so after giving it worms will be found coming out in the droppings, all of which should be carefully removed and burned. Now, water to drink should be given and food supplied in the usual manner. After one month this treatment should be repeated, if there still seem to be signs of worms. The Epsom Salts mentioned above should be mixed in about two cups of water, for the adults, and one cup for kids.

Pox. This disease is usually only found on the udders of goats that are giving milk, and that most frequently in the case of those that have but recently given birth to kids. Small swollen sores are found on the udders, and these usually break when a small amount of pus comes out and water scabs form. The udder becomes very tender, so much so that the goat may object to being milked. She also probably will develop some fever, and show signs of discomfort and restlessness.

From the nursing mother the disease may easily be spread to the sucking kid, sores of a similar nature breaking out about its nose and mouth, also perhaps on other parts of body. The one who milks may even get such sores on the fingers. But the disease is not a very serious one after all. The chief thing is to keep it from spreading amongst the other goats. Therefore, the udder should be

well washed twice a day, before milking time, with phenyle solution, and the milker should see to washing his hands in the solution before he touches any of the other goats. The sick goat should be kept in a separate place, and her udder should have a treatment of clean sweet oil each time after the milk has been drawn and it has been washed with the phenyle. A dose of Epsom Salts, such as was described above, should be given to her very carefully about twice a week until the trouble is over. Whether the udder is tender or not, the milk must be drawn, otherwise there will be danger of caked udder forming.

Caked Udder. This trouble is most apt to affect goats that are heavy milkers, and that when they have but recently given birth. It may be caused by a blow on the udder but the most frequent cause is due to lying on cold damp ground. More recently there is some reason to think that the trouble may be inherited. In any case, it is a serious matter which requires very prompt and careful attention, otherwise a good goat may be spoiled for life. Another possible cause may be due to sudden death of the kid or kids, or sickness which prevents their drinking or sucking as they should. Under the last heading it was pointed out that all milk should be drawn off very carefully even when a goat may have sores or pox on the udder.

Close attention must be paid to the animal during the first two or three weeks after giving birth in order to see that there is no hardening or swelling of the udder anywhere. Generally at first there will be one or more small spots where this may be noticed, and at once prompt treatment must be applied. Otherwise the hardness will spread to one whole side, or even to the whole udder. It will then be most difficult to cure the animal.

As soon as the first signs are observed, the goat should be removed to some quiet warm spot, and hot water should be prepared, say about 3 seers. Into this a small spoonful of turpentine should be emptied, or else two large spoonful of Espom Salts, and soft heavy cloth should be secured for the purpose of wetting thoroughly with this hot solution, then wringing out the excess water and applying to the caked portion. The goat may not be able to bear the cloth too hot, but as soon as it becomes somewhat cool it should be removed and another hot one applied, it being held there with both hands. Occasionally a little rubbing of the udder with hot sweet oil should be done in between the applications of hot cloths. Also, slow gentle attempts *to draw off the thick stringly milk should be made.* It may be necessary to keep up this process for an hour or more each time, and it should be done at least twice and perhaps even more frequently each day. This is necessary if the goat is to be saved. In a case like this one must have deep pity for the goat.

After each period of treatment described above, the application of Iodine Ointment, if available, is advisable. This can be had in larger centres but not in villages. Failing the application of such ointment one can prepare an ointment of turmeric powder and sweet oil, the powder to be in very fine condition, and just enough oil mixed in, to make a smooth salve. This should be put carefully all over the affected part, and then a warm clean cloth is to be tied over the whole udder, with a good supply of dry straw or grass for the goat to lie on, and she is to be kept away from cold or dampness. She should be fed at regular intervals small amounts of easily digested feeds, and she must have good nursing all the while, in which case it may be possible to cure her.

Indigestion. This trouble affecting the stomach and organs of digestion ought not to occur if feeding has been attended to properly. However, if there has been any sudden change in the make-up of the feeds or in their proportions, or if the goat has eaten something it ought not to have had, there is very likely to be trouble. In the hot season when the variety of feeds, especially when out grazing, is apt to be limited and when there is dirty stagnant water, and only that kind in the pools, one must be very careful when one's goats go out to graze.

When indigestion comes on sharp pain develops and the goat will roll on the ground, stretch itself and perhaps even cry out. Young kids will especially show much signs of distress. In their case this trouble may come on even from drinking cold milk. Hence it is important that motherless kids always be given warm milk to drink.

One of the first things to do is to put the animal in a warm place and apply dry hot cloths to the stomach, and prepare a half cupful of warm sweet oil, adding a small spoonful of turpentine, and give this to an adult animal, reducing the amount considerably for small kids. Rather than offer cold water, it would be better to prepare water that has been somewhat warmed for drinking. If the treatment needs to be repeated one should do so in 6 hours or so. If there have not been droppings a liberal dose of warm castor oil, 2 large spoonful for adult and much less for very small animals, will be beneficial. The warm oil will become thin, so should be given in a bottle with long neck.

An animal suffering from indigestion should be fed carefully for some time. Feeds that are easily digested and which agree with the goat should be selected, and any changes that are to be made should be made gradually.

There is a tonic mixture that can be prepared in larger centres in chemists' shops, and if one is able to secure this mixture it will be well to get and feed it. Look for it in Special Notes.

Diarrhoea. Too much dampness, or too much fresh green feed in wet condition, or too sudden a change in the feeding will bring on this condition of diarrhoea. This trouble is closely related to Indigestion, and much the same treatment for adult goats is required. Warmth, a good dose of castor oil, and dry grass or fodder, with clean, fresh slightly warm water to drink, will generally bring about good results. At any rate, the amount of feed should be cut down so that the digestive system may have a good rest. It will be well to keep the affected goat in a separate place.

Young kids are subject to this trouble, and in their case one has to be very careful. Cold milk, drinking too quickly, lack of cleanliness, also cold and dampness, irregularity in feeding or eating too much because of too long intervals between feeding, eating too much green grass especially after drinking milk—all these are causes which bring on the trouble.

The affected kid should be removed at once to a warm dry place and should be kept covered with a heavy warm cloth, especially if the weather is cold. For a small kid a small spoonful of warm castor oil, and for a larger one, two spoonful should be given. It should not be allowed to suck its mother but her milk should be boiled and a thin paste of browned fine wheat-flour should be cooked in this milk and this fed in small quantities, 4 or 5 spoonful, every hour or so. Be sure to keep the kid warm and its place clean, and all feed given to it must be very clean and warm. When it is much better it may be allowed to

take small amounts of milk from its mother, as formerly, but care must be taken to prevent its drinking too much at any given time.

Constipation. This trouble is more apt to affect young kids, especially new-born kids which may not have been able to drink enough of the first thick milk from their mother's udder. This thick milk is necessary for the purpose of cleaning out their digestive systems, and usually kids do get enough of it and everything goes along normally. If a very weak kid does not have good movements of its digestive system, then a dose of warm castor oil, one small spoonful, will probably be all that is required. If one has not been sufficient, after 3 or 4 hours' time try another, keeping the kid dry and warm and also trying to get it to suck its mother. Usually this trouble can be removed.

Adult goats do not have this trouble as a rule, but in case they require treatment for it, Epsom Salts, 2 or 3 large spoonfuls, according to the size and age of the goat, properly mixed in about one-half seer of clean warm water and carefully fed by means of a long-necked bottle, will doubtless remove the cause. Coarse grass, and green leaves to eat, plenty of clean fresh water to drink, and exercise will help to keep one's goats in good condition.

Sore Teats. These may be caused by scratches or wounds which happen while the goat has been grazing, or through some accident, such as a cut. Cleanliness is the most important thing in treatment, the sores or cuts to be washed out with phenyle water (warmed) or else just clean fresh warm water, and iodine applied to the sore places. Following that an application of clean warm sweet oil, or even castor oil, to the affected place will be beneficial. It will be well to keep the udder protected by means of a cloth bag which

must be kept clean, and of course the milk must be drawn off regularly. One's hands must be thoroughly cleaned when treating such sores or cuts. It will not do to regard this matter lightly for one may suffer much loss through carelessness even in the case of sore teats, or wounds, etc.

SPECIAL NOTES.

1. Goats in a weak or undernourished condition may be given a tonic which can be prepared in chemists' shops in larger centres, its ingredients being as follows:— 2 ounces of Nux Vomica, 2 ounces of Gentian, and one ounce each of Ginger and Bi-carbonate of Sodium. All this mixed together in powdered form is to be fed morning and evening, one small spoonful each time to an adult goat, and about half that amount, or even less, to younger animals, according to their age and size. This is a good tonic and will help much in bringing weak goats into good condition. It should be continued as long as seems to be necessary.

2. One should pay attention to the growth of the hoofs of one's animals, especially if they do not have much opportunity to go out to graze or play, etc. The growth of the horny substance on the hoof often causes much discomfort, and it should be removed by means of a sharp knife or sharp blade of a sickle, cutting both sides evenly and not too close to the tender fleshy part near the upper portion of the hoof. At such times it will be well to clean out the feet thoroughly, removing all dirt from in between the hoofs.

If there is any indication of lameness or soreness, it will be well to dissolve one-half pound of copper sulphate in two and one-half quarts (seers) of water, keeping this solution in some earthen vessel. Every day the foot or feet should be allowed to stand in this warmed solu-

tion for a few minutes until the trouble is over. Be sure to keep the horny substance evenly trimmed.

3. A large stiff brush, or failing that, a dry rough gourd such as 'dodaka', should be kept on hands for the purpose of rubbing or brushing each animal, small and large, not less than 2 or 3 times a week. This will help to keep the skin and hair in good condition and one will also be able to discover any evidences of ticks or lice. If lice are found a good salve to kill them can be made by mixing sweet oil, turmeric powder and a small quantity of fine salt. This should be applied in the places where the lice are found. It will be effective for ticks too, but in either case the quarters where the goats are kept must be thoroughly cleaned out with phenyle water, and for ticks it would be well to burn out the place with either a blast lamp (stove) or wad of cloth soaked in kerosene. Keep a couple of buckets of water ready in case of fire.

4. When the weather is hot it will do no harm to give the goats a nice bath in the middle of the day, say once in two weeks or so. At such times they should be tied in some dry shady place and the excess water should be wiped off their skins so that they may dry off soon. Use soap or soap-seed for making a good lather, and take pains to clean off all of the dirt that may have accumulated on the skin of the animal. If it has been necessary to use the salve mentioned above for the treatment of lice or ticks, a good clean bath will help to get rid of these creatures too, say a day or two after the application of the salve.

5. When milking one should always make it a point to draw off all of the milk, not leaving any unless for the sucking kids to draw off. If one teat or two are left for the kids, one must make certain that they suck out all that

is to be had. The leaving of any milk in the udder not only tends to 'dry up' the goat much sooner than is necessary, but also may tend to bring on Caked Udder and other trouble. Hence, both for the sake of a full supply of milk and for the prevention of any udder troubles this point must be observed most carefully. Also, wetting the teat with milk or even water for the sake of making it easier to draw off the milk is not a good thing. It is far better to keep the udder and teats dry and clean when milking. Do not forget that the udder must be properly looked after always, for so very much depends on keeping it in good condition.

6. Learn to be affectionate and thoughtful with your goats, and they will show that they appreciate such treatment. They are intelligent animals and soon learn to know just what is expected of them. Good care is of far more importance than everything else, and this applies to everything connected with keeping them. If you follow faithfully the directions given in this little book you will be surprised how soon you can bring about much improvement in your goats. If you keep them properly, they will do much towards helping to keep you.

APPENDIX.

Publications in English on Milk Goats.

1. The Book of the Goat, by H. Pegler.
2. Modern Milk Goats, by Irmagarde Richards.
3. The Milk Goat, by Lewis E. Pendleton.
4. Profitable Goat Keeping, author not known.
5. The British Goat Society Year Book,
also
6. The British Goat Society Monthly Journal, the two
immediately above to be had from,

THE BRITISH GOAT SOCIETY,
Roydon Road,
Diss. NORFOLK,
ENGLAND.

7. The Goat World, a monthly Journal to be had from,
MR. WILL L. TEWALT, EDITOR,
Vincennes, INDIANA,
U. S. A.

NOTE

The first two can probably be secured either directly from or
through,

MESSRS. THACKER & Co., LTD.,
Booksellers,
BOMBAY.

Number 3 can be secured from the address of No. 7 above, and probably number 4 can be secured there too. Nos. 3 and 4 are rather small books, while Nos. 1 and 2 are much more complete and worth having. However, none of the above are written with other than Western conditions in mind.

It is gratifying to note that the several Provincial Governments are becoming interested in the subject of Indian Milk Goats, and it would be well to get in touch with the Departments of Agriculture concerning this subject in the days ahead. Let there be hearty co-operation with these Departments, and much progress can be made.

Special Note. If this little book should not happen to be available at near-by book-stores, it may always be had for 8 annas, plus Postage 2 Annas, by addressing,

THE PRINCIPAL,

SANGLI INDUSTRIAL & AGRICULTURAL
SCHOOL, SANGLI. (S. M. C.)

